CLAIMS:

1. A bidirectional forage bale dryer comprising a frame, a bale support platform with orifices to permit the passage of air, a lower plenum chamber, an upper plenum chamber, an access opening for access to said platform surrounding wall means to substantially seal said forage bales disposed in a stack on said platform and surrounding a circumferential side surface of said stack in close contact to confine a heated drying air flow connected between said plenum chambers and through said stack, an air flow conduit in communication with respective ones of said lower and upper plenum chambers, each air flow conduit having a first branch conduit in communication with a heat generating device at an air intake inlet, and a second branch conduit in communication with an air suction device adjacent to an air outlet, valve means in each said branch conduit, and means to close or open said valve means whereby to direct said drying air flow upwards or downwards through said stack of forage bales to create a negative pressure through said forage bales disposed on said platform between said upper and lower plenum chambers.

2. A bidirectional forage bale dryer as claimed in claim 1, wherein said surrounding wall means is constituted by a sheet of flexible material capable of adhering to said side surface of said forage bale stack by negative pressure, thereby substantially sealing voids about said side surface of said bales in said stack.

3. A bidirectional forage bale dryer as claimed in claim 2, wherein said sheet of flexible material is a polyethylene sheet capable of resisting to tearing when displaced against said stack by said negative pressure.

4. A bidirectional forage bale dryer as claimed in claim 1, wherein said air intake inlet comprises a fresh air intake conduit and air recirculating conduit, said air recirculating conduit being connected between said air outlet and said air suction device, an exhaust chamber adjacent said air outlet, said exhaust chamber having an air exhaust port and an air recirculating port which is connected to said heat generating device, and control gates to vary the opening of said exhaust port and said

recirculating port whereby to control the amount of air to be recirculated through said heat generating device within the range of from 0% to 100%.

5. A bidirectional forage bale dryer as claimed in claim 1, wherein a negative pressure is in the range of about 3.2 kPa (0.46 psi), said frame being a rigid steel frame and said plenum chambers having a rigid wall structure capable of supporting exerted pressure.

6. A bidirectional forage bale dryer as claimed in claim 1, wherein said forage bales have variable dimensions and are placed side by side to cover the full area of the said bale support platform on at least one layer.

7. A bidirectional forage bale dryer as claimed in claim 6, wherein bales may be disposed on two or more layers, one on top of another.

8. A bidirectional forage bale dryer as claimed in claim 1, wherein there is further provided humidity and temperature sensing devices connected to said first and second branch conduits and to said control means to monitor the temperature and humidity of air flowing in said conduit, said control means having an algorithm to monitor signals from said sensing devices and to operate said heat generating device and air suction device, and current sensing means connected to a motor of said air suction device and said control means to monitor power consumption and air flow rate.

9. A bidirectional forage bale dryer as claimed in claim 8, wherein said heat generating device is designed to rise air temperature to at least 60°C, considering the actual airflow requirement which depends on the bale platform area, the bale stack height and the ambient air temperature, heat generating device and air suction device.

10. A bidirectional forage bale dryer as claimed in claim 4, wherein said control gates are constituted by a plurality of pivotal louvers secured across said exhaust port and recirculating port, and secured to motorized or hand controlled

mechanical couplings to tilt said louvers to any position between a fully open to a fully closed position to control the air flow through said ports.

11. A bidirectional forage bale dryer as claimed in claim 1, wherein said lower plenum chamber is located under said support platform, said upper plenum chamber being supported by said frame at a predetermined distance above said support platform.

12. A method of drying forage bales comprising the steps of:

i) providing a chamber having a bale support platform with orifices to permit the passage of air therethrough, a lower plenum chamber under said support platform and an upper plenum chamber spaced above said bale support platform to define an accessible stacking area above said platform, and an air circulating passage connected to each said plenum chamber;

ii) placing a predetermined number of bales to be dried on said bale support platform in close contact with one another to form a stack of bales;

iii) disposing a surrounding wall means about a circumferential side surface of said stack of bales to confine a heated drying air flow between said plenum chambers and through said stack; and

iv) applying a drying air flow upwards and downwards in said air circulating passage and through said stack to create a negative pressure through said stack, and to adhere said wall means to a circumferential side surface of said stack.

13. A method of drying forage bales as claimed in claim 12, wherein said step (iv) comprises the step of inverting said drying air flow between said plenum chambers, whereby said heated drying air flow through said stack is inverted so that said stack of bales dries substantially evenly therethrough.

14. A method of drying forage bales as claimed in claim 12, wherein there is further provided after step (iv) the step of recirculating said drying air flow, or at least partly, through said air circulating passage.

15. A method of drying forage bales as claimed in claim 13, wherein said air circulating passage comprises an air flow conduit in communication with each said lower and upper plenum chambers, each air flow conduit having a first branch conduit in communication with a heat generating device at an air intake inlet and a second branch circuit in communication with an air suction device adjacent an air outlet, and valve means in each said branch conduits, said step (iv) comprising actuating said heat generating device to heat air circulating in said air flow conduits, and actuating said air suction device to cause air flow through said air flow conduits, said air flow being aspired across said plenum chambers and through said stack of bales.

16. A method of drying forage bales as claimed in claim 15, wherein said steps of inverting said drying air flow is achieved by closing and opening predetermined ones of said valve means.

17. A method of drying forage bales as claimed in claim 14, wherein there is further provided the steps of monitoring the temperature and humidity of said drying air flow to determine the approximate percentage humidity in said bales of said stack.

18. A method of drying forage bales as claimed in claim 12, wherein said step (ii) comprises placing two or more bale layers disposed one on top of another, on said bale support platform by loading machinery accessible to said stacking area.

19. A method of drying forage bales as claimed in claim 12, wherein said step (iii) comprises disposing a sheet of flexible film material about said stack of bales and between said plenum chambers, whereby upon the application of drying air flow as in step (iv), said negative pressure will cause said flexible film material to be collapsed against said circumferential side surface of said stack of bales, whereby said drying air flow will be confined through said stack.

20. A method of drying forage bales as claimed in claim 15, wherein there is further provided the step of monitoring the current consumption of said air suction device to determine air flow rate.